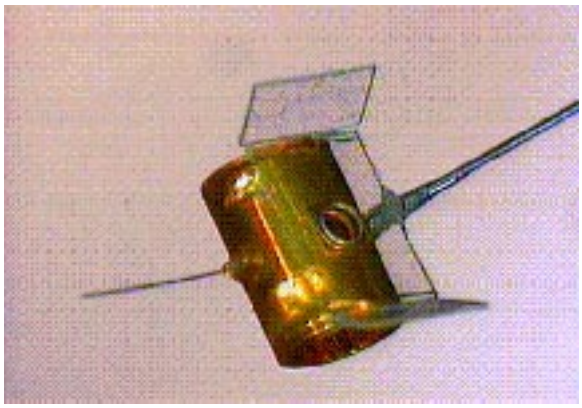
Los Alamos
Inertial Confinement Fusion

October 1997 Progress Report

Target Fabrication:

Thin Shell Instabilities:



We provided targets for the first weapons physics experiments on Omega. These targets were part of the thin shell instability experimental campaign. These targets were thin wall cylindrical hohlraums modified with a backlighter mounted directly on the hohlraum wall. Thin wall hohlraums are used to minimize debris in the target chamber. The directly mounted backlighter feature eliminated the need to design a backlighter mounting stalk that was bent to miss the beams. Opposite the backlighter was a copper Rayleigh-Taylor sample also mounted on the hohlraum wall -- the usual position for the driven samples. Fourteen of these targets were supplied for two days of shooting. Excellent results were obtained from these experiments.

Target Physics:

Laser Plasma Instabilities:

During October, Nova shots were used to investigate several topics on laser-plasma instabilities. These included the behavior of SRS and SBS at low density. This is important because low-density hot plasmas are expected near the laser-entrance holes of NIF hohlraums. Also, the behavior of laser-plasma instability with varying density tests our present understanding of these processes. The SRS and SBS onset intensity was measured for a long scale plasma in the gas-filled, toroidal hohlraum plasma configuration. The plasma temperature is about 2.5 keV and the electron density is about 6% critical, for the propane gas-filled hohlraum. As expected from our theoretical model, the SRS onset intensity was found to be higher, presumably due to the expected higher damping of the SRS daughter plasma wave at lower density. Also as expected, the SBS onset intensity was similar to that at 11% critical density. Moreover, some models predict strong modification of the electron velocity distribution at these low densities, which was expected to smear the sharp reflectivity increase observed at higher density. Detailed analysis comparing these onsets is underway to quantify this effect. We also obtained excellent images of the scattered SRS and SBS light around the onset intensity on these shots. They are being analyzed to see what insights they might provide in this area.

UR/LLE Tritium Removal Systems:

The conceptual design was completed for two Tritium Removal Systems (TRSs) that are needed for the safe and reliable handling of DT at UR/LLE during campaigns with cryogenic DT targets on OMEGA. A conceptual design review of the two TRSs was held at UR/LLE in September of this year. One of these TRSs is needed for DT operations on the Omega Cryogenic Target Handling System, and the other TRS is needed for operations associated with the Target Tank. During FY98, the preliminary design of these TRSs will be completed and a vendor selected for their construction. These TRSs need to be installed and operational at UR/LLE by mid FY00.